



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Title: THIN SHEET MIRROR AND
Nd₂O₃ DOPED GLASS

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Examiner: BLACKWELL RUDASIL, G.A.

Group Art Unit: 1775

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Sir:

BRIEF ON APPEAL

This Brief supports the appeal to the Board of Patent Appeals and Interferences from the final rejection dated May 6, 2003, in the above-captioned application. Applicant filed the Notice of Appeal on July 29, 2003, and now submits this Brief in triplicate, as required by 37 C.F.R. § 1.192(a). Applicant also has filed, or is filing herewith, the appropriate petition, and paid, or is paying herewith the required fee to gain an extension of the due date for filing this Brief to the Board.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Corning Incorporated.

II. RELATED APPEALS AND INTERFERENCES

With respect to the appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, there are no such appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-4, 6, 7, 9 and 10 were rejected in the final Office Action dated May 6, 2003.

Applicant had amended claims 1 and 7, and canceled claims 5, 8 and 11 in an Amendment dated February 5, 2003.

IV. STATUS OF AMENDMENTS

The Amendment After Final Rejection filed on July 3, 2003 has not been entered.

Applicant is presenting again the amendments, involving the claims only, herewith. Those are the pending claims that are the subject of this Appeal and are set forth in the attached Appendix. Applicant believes that these claim amendments do not introduce new matter into the application and do not necessitate a new search. Indeed no new claim is added by virtue of these amendments. Applicant also believes that by these amendments, the claims are presented herewith in a better form for appeal.

V. SUMMARY OF INVENTION

FIELD OF THE INVENTION

A reflecting mirror comprising a thin sheet of glass, and an alkali metal-zinc-borosilicate glass doped with neodymium oxide (Nd_2O_3) and adapted to be drawn in the form of a thin sheet.

BACKGROUND OF THE INVENTION

Thin sheet glass, commonly referred to as microsheet, is well known in the glass art. The glass sheets have a thickness less than 0.5 mm, a standard thickness being in the range of 0.3 to 0.4 mm. Microsheet glass is used for such diverse purposes as protective covers for satellite solar cells, laptop LCDs, and glass-plastic laminates.

Mirrors are commonly produced by applying a highly reflecting film or coating of, for example, silver or aluminum, over one flat surface of a glass sheet. Light rays pass through the glass sheet and are reflected back to create the familiar image. Thus, the effective light path in the glass sheet is twice the thickness of the glass sheet.

The present invention is particularly concerned with a rearview mirror such as used in vehicular transport means on sea, on land, or in the air. A problem of long standing is that of visual discomfort, and loss of object definition, created by reflection of certain radiation. The reflection of illumination from a mirror, particularly at night, can be particularly serious. This has led to special mirrors that can be tilted at night. A similar effect occurs with reflected sunlight, especially when the sun is just rising or setting.

It has been reported that this problem largely arises from a relatively narrow portion of the spectral energy distribution in light reflected by a mirror. In terms of color, this is the yellow region which lies primarily between wavelengths of 565 and 595 nm. The red, green and blue regions, which lie outside this wavelength range, appear to provide little or no contribution to the problem.

It is then a primary object of the present invention to provide a reflecting mirror that is improved with respect to the visual discomfort and object blurring that tends to occur with reflected illumination and sunlight.

It is another object to provide a glass that removes, in part at least, the yellow color region in reflected light.

It is a further purpose to provide this selective color effect in glass of microsheet thickness.

It is still another purpose to provide a glass having this desired color absorption effect, in conjunction with viscosity properties that enable the glass to be drawn as microsheet, that is in a thickness less than 0.5 mm.

SUMMARY OF THE INVENTION

The invention resides in part in a reflective mirror comprising a sheet of alkali metal-zinc-borosilicate glass bonded to a reflecting surface, the glass having a thickness less than 0.5 mm and being doped with Nd₂O₃ in an amount sufficient to reduce the spectral transmission in the range of 565-595 nm.

The invention further resides in a sheet of an alkali metal-zinc-borosilicate glass containing sufficient Nd₂O₃ in its composition to reduce the transmission of 585 nm wavelength to less than 50% in a 0.6 mm path length.

VI. ISSUES

The issue presented for consideration in this Appeal is:

Whether claims 1-4, 6, 7, 9 and 10, as amended herein, are patentable under 35 U.S.C. § 103 as being nonobvious over Karpen (United States Patent No. 5,844,721), in view of EP '128 (European Patent Application Publication No. 0 441 128 A1), and further in view of Applicant's disclosure.

VII. GROUPING OF CLAIMS

In compliance with 37 C.F.R. § 1.192(c)(5), Applicant states that all of the claims do not stand or fall together. For purposes of having this Appeal proceed efficiently, however, Applicant agrees to proceed with claims 1-4, 6, 7, 9 and 10 as one group of claims standing together as patentable.

VIII. ARGUMENTS

A. Applicable Law: 35 U.S.C. § 103

35 U.S.C. § 103 requires that an invention, to be patentable, must not be obvious over the prior art “at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” The landmark case on obviousness was Graham v. John Deere Co., 383 U.S. 1 (1966), which set forth three factors for determining whether an invention is obvious: (i) the scope and content of the prior art; (ii) differences between the prior art and the claims at issue; (iii) the level of ordinary skill in the pertinent art; and (4) objective evidences of non-obviousness such as commercial success, prior skepticism, copying, long felt but unresolved needs, failure of others, etc. All evidences must be considered and given weight in reaching a decision on obviousness under 35 U.S.C. § 103.

Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1561, 1 USPQ2d 1593, 1594 (Fed. Cir. 1985) cert. denied, 481 U.S. 1052 (1987); Hodosh v. Block Drug, 786 F.2d 1136, 1143, 229 USPQ 182, 188 (Fed. Cir. 1986), Cert. denied, 479 U.S. 827 (1986); Simmons Fastener Corp. v. Illinios Tool Works, 739 F.2d 1573, 1575, 222 USPQ 744, 746 (Fed. Cir. 1984), cert. denied, 471 U.S. 1065 (1985). Moreover, the prior art itself must suggest the desirability and, therefore, obviousness of a modification of a reference or the combination of references to achieve a claimed invention. Hodosh v. Block Drug, 786 F.2d at 1143 n.5, 229 USPQ at 187 n.5; In re Gorden, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

B. Claims 1-4, 6, 7, 9 and 10, as amended herein, are patentable over Karpen in view of EP '128 and further in view of Applicant's disclosure.

In the final Office Action of July 6, 2003, the Examiner rejected pending claims 1-4, 6, 7, 9 and 10 under 35 U.S.C. § 103 as being unpatentable over Karpen, in view of EP '128, and further in view of Applicant's disclosure. In the final Office Action, the Examiner stated that:

Claims 1-4, 6-7, 9-10 are rejected under 35 U.S.C. 103(a) as being
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unpatentable over United States Patent No. 5,844,721, Karpen, in view of United Kingdom Published Patent Application No. 0441128, GB '128¹, further in view of Applicant's disclosure.

Karpen discloses a rearview window with a glass mirror that is doped with Nd₂O₃, which acts as a filter for yellow light. The glass mirror has silver backing with a transparent glass pane in front of the silvered reflective surface.

The Nd₂O₃ is contained in the glass in a sufficient amount to reduce the amount of vision discomfort from yellow light with the concentration of Nd₂O₃ ranging from 5-30%. The glass absorbs 95-98% of the light in the wavelength ranging from 565-595 nm (columns 10-11, lines 52-6). Karpen also discloses that the transmittance of light through the glass is related to the thickness of the glass by an absorptive coefficient:

$$\ln(T) = -AL$$

wherein L is the thickness of the glass, A is the absorption coefficient, T is the percentage of light transmitted, and ln is the natural logarithm. Furthermore, the glass used as the glass pane can be made of a soda lime glass, (column 9, lines 11-23). An example of a glass used as a rearview mirror glass pane is glass made of a mixed alkali zinc silicate glass. Karpen does not specifically disclose the composition of the glass.

GB '128 [EP '128, sic] disclose[s, sic] a glass with Nd₂O₃ present in an amount greater than 5%. The glass can have the following components in wt%, (page 2):

SiO ₂	40-60
Nd ₂ O ₃	10-30
B ₂ O ₃	5-15
Na ₂ O	3-18
ZnO	0.1-10
K ₂ O	0-3
Al ₂ O ₃	0-7

The glass of GB '128 [EP '128, sic] can be used for filters, (page 5, liens 33-37). The softening point temperature as claimed by applicant for Nd₂O₃ containing glass is present in the GB '128 [EP '128, sic] glass as the glass composition of GB '128 [EP '128, sic] substantially overlaps that as claimed by applicant, (page 9, line 50).

According to applicant's disclosure, it is known in the art that a thin sheet of glass, called a microsheet, can a[sic] have a thickness of less than 0.5 mm. In

¹ This document, indeed, should be European Patent Application Publication No. 0 441 128 A1. As Applicant's Counsel has pointed out previously:

Applicant noticed that hitherto in the application the Examiner and Applicant have been consistently referring [to] reference European Patent Application Publication No. 0 441 128 A1 (hereinafter EP '128) as "United Kingdom Published Patent Application No. 0441128, GB '128." Applicant identified and submitted a copy of EP '128 in the invention disclosure filed on December 13, 2001. To the extent the Examiner agreed in the telephone interview with Applicant's counsel on June 9, 2003, Applicant hereinafter takes liberty to use EP '128 to identify this reference in this and future papers.

addition, the microsheet can be used for different purposes, such as a laptop LCD. It is also known that mirrors are commonly made by placing a reflective film or coating over the surface of a glass sheet (page 1, sections [0003-0004]). Karpen discloses a rearview mirror with a specific example that utilized an alkali zinc silicate glass however a specific glass composition is not mentioned. The glass disclosed by GB '128 [EP '128, sic], has the composition of an alkali zinc silicate glass that can be used as filter. As such, it is within the skill of one in the art to modify the rearview mirror having a Nd₂O₃ containing glass with more than 5 wt% Nd₂O₃ present in the glass to obtain a rearview mirror that blocks more yellow light making for a better night vision for the driver.

While Karpen discloses that the glass is 0.5 mm thick or more, (claim 1), it is known in the art that glass sheets can have a thickness less than 0.5 mm used in diverse applications, such as a laptop LCD. It is within the skill of one in the art to modify the thickness of the glass through routine experimentation to obtain a thickness that provides the optimum amount of light transmittance at the desired wavelength. Especially in view of the fact that the Lambert-Beers Law provides for a correlation between the thickness of the glass and the percentage of light transmitted (Karpen, column 9, lines 15-23).

In response, Applicant, through his Counsel, filed an amendment on July 3, 2003, in which Applicant further amended claims 1, 2 and 7 as presented in the Appendix of this Brief. As can be seen, Applicant has amended claims 1 and 7 by reducing the content of Nd₂O₃ in the glass composition from "at least 5%" to "5-10%." Applicant also filed a declaration under 37 C.F.R. § 1.132 in support of the application. In an advisory action dated July 15, 2003, the Examiner entered the declaration into the application. However, the Examiner denied entry of the amendment, citing reasons that "they are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal." To support this conclusion, the Examiner opined that "[t]he proposed amendment does not place the application in better form for appeal. Although Applicant has narrowed the claim to a range of 5-10%, EP '128 still applies because because[duplicate, sic] EP '128 has 10% of neodymium [oxide] as an endpoint." The Examiner further opined that "the affidavit fails to provide factual evidence showing the criticality of the neodymium oxide range and other glass component, which also have overlapping ranges with EP '128. The

proposed amendment does not place the application in condition for allowance as 10% is a common point between the glass compositions of EP '128 and the present application.”

1. Description of Karpen

Karpen discloses a rearview mirror suitable for use as a rearview mirror for land, water and aircraft and motor vehicles in particular. The glass mirror includes glass containing Nd₂O₃. Karpen discloses that The Nd₂O₃ filters out the naturally occurring yellow light produced by a hot incandescent filament, thereby producing a color-corrected light. Karpen discloses that yellow light contributes to a lack of contrast. Karpen also discloses that the Nd₂O₃ in the glass will filter out the yellow light from the rising or setting sun in the rearview mirror.

Karpen mentions that soda lime glass or mixed zinc silicate crown glass containing Nd₂O₃ may be used for the rearview mirror. However, as the Examiner admitted in the final rejection, a specific glass composition is not disclosed in Karpen.

2. Description of EP '128

EP '128 discloses high Nd₂O₃ glasses, e.g., particularly for ophthalmic uses, which have capability for chemical strengthening and physical strengthening. The glass compositions as disclosed in EP '128 is summarized in Chart I below:

CHART I

	EP '128		
	Broadest	Preferred	Most Preferred
SiO ₂	40-60	45-60	50-55
Al ₂ O ₃	0-7	0	0
B ₂ O ₃	5-15	5-10	6-8
ZnO	0.1-10	1-7	2-5
Na ₂ O	3-8	10-15	11-13
K ₂ O	0-3	0	0
Na ₂ O+K ₂ O			
Nd ₂ O ₃	10-30	20-30	22-26
As ₂ O ₃ /Sb ₂ O ₃	0-1	0-0.5	0.2-0.4
Li ₂ O	0-3	0	0
PbO	0-15	0	0
MgO	0-3	0	0
CaO	0-3	0	0
SrO	0-3	0	0
BaO	0-3	0	0
Σ(V ₂ O ₅ +Cr ₂ O ₃ +Mn ₂ O ₃ +Fe ₂ O ₃ +CoO+NiO+CuO)	0-7	0	0
TiO ₂	0-5	0	0
Pr ₆ O ₁₁	0-1	0	0

Data in this chart is from Table 1, page 4 of EP '128.

EP '128 is particularly concerned with the strengthenability of the glass. In page 5, lines 46-50, EP '128 discloses that “[t]he strengthenability of the glasses of this invention is achieved very advantageously, despite the high Nd₂O₃ contents by the compositional features, for example, regarding inclusion of ZnO and Na₂O, and exclusion of K₂O, *inter alia*.” EP '128 does not disclose any information with regard to the devitrification of Nd₂O₃ in the glass.

All of the glass examples disclosed in EP '128, in Table 4, pages 8-9, have high Nd₂O₃ content. The lowest Nd₂O₃ content in these glasses is 13.16% by weight.

3. A prima facie case of obviousness cannot be established over EP '128 and Karpen and further in view of the disclosure of the present application.

From the advisory action by the Examiner having a mailing date of July 15, 2003, the

Examiner had the opinion that claims 1-4, 6, 7, 9 and 10 are prima facie obvious over Karpen, EP '128 and the disclosure in the application, for substantially the same reasons in the final rejection dated May 6, 2003.

A proper prima facie case of obviousness requires the examiner to satisfy three requirements. First, the prior art relied upon, coupled with knowledge generally available to one of ordinary skill in the art, must contain some suggestion which would have motivated one of ordinary skill to combine references. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the examiner must show that, at the time the invention was made, the proposed modification had a reasonable expectation of success. See Amgen v. Chugai Pharm. Co., 927 F.2d 1200, 1209, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Finally, the combination of references must teach or suggest each and every limitation of the claimed invention. See In re Wilson, 424 F.2d 1832, 1385, 165 USPQ 494, 496 (CCPA 1970). Moreover, both the suggestion and the reasonable expectation of success must be found in the prior art, not in the applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991).

The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Fritch, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992). The Examiner did not, and is unable, to point to any place in EP '128 where it suggests or provides a motive to modify the EP '128 glass composition to obtain the reflecting mirror comprising a sheet of an alkali metal-zinc-borosilicate glass having the composition as defined in claim 1, as amended herein. Whereas Karpen discloses the rearview may contain Nd₂O₃ in the amount of 5-30%, it does not provide desirability to modify the EP '128 glass composition in terms of other glass components.

The glass composition recited in claims 1 and 7, as amended herein, are substantially different from what is disclosed in EP '128. A side by side comparison of the glass composition and the disclosure of EP '128 is provided in CHART II below. Data in shaded boxes of CHART I indicate substantial difference between the glass composition of the present application and the EP '128 disclosure.

CHART II

	The present invention (%)	EP '128		
		Broadest	Preferred	Most Preferred
SiO ₂	55-70	40-60	45-60	50-55
Al ₂ O ₃	0.5-4.5	0-7	0	0
B ₂ O ₃	6-14	5-15	5-10	6-8
ZnO	3-10	0.1-10	1-7	2-5
Na ₂ O	5-11	3-8	10-15	11-13
K ₂ O	2-9	0-3	0	0
Na ₂ O+K ₂ O	7-20			
Nd ₂ O ₃	5-10	10-30	20-30	22-26
As ₂ O ₃ /Sb ₂ O ₃		0-1	0-0.5	0.2-0.4
Li ₂ O		0-3	0	0
PbO		0-15	0	0
MgO		0-3	0	0
CaO		0-3	0	0
SrO		0-3	0	0
BaO		0-3	0	0
Σ(V ₂ O ₅ +Cr ₂ O ₃ +Mn ₂ O ₃ +Fe ₂ O ₃ +CoO+NiO+CuO)		0-7	0	0
TiO ₂		0-5	0	0
Pr ₆ O ₁₁		0-1	0	0

(i) As Applicant pointed out in previous submissions, the K₂O amount of the glass composition of the present application are quite different than what is disclosed in EP '128. EP '128 prefers not to have K₂O. However, the glass composition of the glass of the present invention contains K₂O in the amount of 2-9% by weight.

(ii) As is clear from CHART II, the Nd₂O₃ level of the glass composition of the present application is substantially different from the EP '128 disclosure. The only

overlapping point in Nd₂O₃ is 10% between the present application and the broadest compositional range as disclosed in EP '128. Indeed, the preferred Nd₂O₃ amount (20-30%) in the EP '128 disclosure are far beyond the glass composition in the claims of the present application as amended herein. One of ordinary skill in the art would not and could not derive the suitable Nd₂O₃ range of 5-10% of the present application from the 10-30% range as disclosed in EP '128. Indeed, in terms of Nd₂O₃, EP '128 teaches away from the present application, if anything.

(iii) As Applicant pointed out in previous submissions, all 24 examples of EP '128 fall outside of glass composition of the present application.

Thus, whereas there is still overlapping between the glass composition range of claims 1 and 7, as amended herein, one or ordinary skill would not be motivated to modify even the broadest glass composition range of EP '128 to obtain the glass having the composition range of the present invention, as amended herein. One of ordinary skill would not be motivated to combine Karpen, EP '128 to arrive at the invention of the present application in the claims as amended herein. In addition, as mentioned supra, the combination of Karpen and EP '128 do not teach or suggest all of the claim elements of the invention of claims as amended herein in the present application.

2. The evidence of unexpected results rebuts any prima facie case of obviousness.

Even assuming, arguendo, that the combination of Karpen and EP '128 could have established a prima facie obviousness case of the present application as amended herein, which they can not, such case is rebutted by the evidence of unexpected results achieved by the present invention. See In re Blauwe, 736 F.2d 699, 222 USPQ 191 (Fed. Cir. 1984).

(i) The glass composition of the present application is suitable for producing thin sheet glass having a thickness of less than 0.5 mm, via, for example, the slot-draw process.

EP '128 and Karpen do not contain disclosure as to whether the glasses of EP '128 are fit for slot-draw process. Indeed, neither of these two references suggests how to modify the glass compositions as taught in EP '128 to render them suitable for slot-draw production processes. It is the Applicant's belief that many glass compositions in the range as disclosed in EP '128 are not suitable for slot draw process.

(ii) The Nd₂O₃ in the glass of the present application tends less likely to devitrify during the glass production process. The Examiner's attention is directed to comparative Example 8 of the present application, page 5. This example, featuring 11% Nd₂O₃, falls within the broadest glass compositional range as disclosed in EP '128 but outside of the glass composition as recited in claims 1 and 7 of the present application, as amended herein. Paragraph [0024], page 8 of the present application discloses that Nd₂O₃ in this glass devitrifies during the production process. Therefore, Applicant has reason to believe that many glasses falling within the broadest compositional range as taught in EP '128 are not suitable for slot draw process without devitrification, this is especially true when the high Nd₂O₃ content is taken into consideration. See Declaration of Ronald L. Stewart Under 37 C.F.R. § 1.132, filed on July 3, 2003 and entered by the Examiner into the application.

The present application claims reflective mirror and glass sheet containing Nd₂O₃ doped glass having the above compositions. Thus, the technical advantages of the glass composition constitute technical advantages of the reflecting mirror and glass sheet as claimed.

For all these reasons, claims 1-4, 6, 7, 9 and 10, as amended herein, are not obvious under 35 U.S.C. § 103 over Karpen in view of EP '128, further in view of Applicant's disclosure in the application.

IX. CONCLUSION

In conclusion, Applicant requests a reversal of the grounds of rejection maintained by the Examiner.

If there are any other fees due in connection with the filing of this Brief on Appeal, please charge the fees to our Deposit Account No. 03-3325. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

The undersigned attorney has been granted limited recognition by the Office of Enrollment and Discipline of the USPTO to practice before the USPTO in capacity as an employee of a Corning Incorporated. A copy of the document granting such limited recognition is submitted herewith for the record.

Respectfully submitted,

Dated: November 26, 2003

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November 26, 2003


Siwen Chen (Signature)

APPENDIX TO BRIEF ON APPEAL

The claims on appeal are as follows:

1. *(Currently Amended)* A reflecting mirror comprising a sheet of an alkali metal-zinc-borosilicate glass bonded to a reflecting surface, the glass sheet having a thickness less than 0.5 mm, and being doped with Nd₂O₃ to substantially reduce the spectral transmission of the glass in the wavelength range of 565-595 nm, wherein the alkali metal-zinc-borosilicate glass consists essentially, by weight percent on an oxide basis, of

SiO ₂	55-70%
Al ₂ O ₃	0.5-4.5%
B ₂ O ₃	6-14%
ZnO	3-10%
Na ₂ O	5-11%
K ₂ O	2-9%
Na ₂ O + K ₂ O	7-20%
Nd ₂ O ₃	<u>at least 5%5-10%</u> .

2. *(Currently Amended)* A reflecting mirror in accordance with claim 1 wherein the glass sheet has a thickness of 0.3 to 0.4 mm.

3. *(Original)* A reflecting mirror in accordance with claim 1 wherein the transmitted radiation at a wavelength of 585 nm is less than 50%.

4. *(Original)* A reflecting mirror in accordance with claim 3 wherein the transmitted radiation at 585 nm is less than 30%.

5. *(Canceled)*

6. (*Original*) A reflecting mirror in accordance with claim 1 wherein the reflecting surface is a silver coating on the back of the glass sheet.

7. (*Currently Amended*) A thin sheet of alkali metal-zinc-borosilicate glass containing Nd₂O₃ to reduce the transmission of radiation at a wavelength of 585 nm to a value less than 50%, wherein the alkali metal-zinc-borosilicate glass consists essentially, by weight percent on an oxide basis, of

SiO ₂	55-70%
Al ₂ O ₃	0.5-4.5%
B ₂ O ₃	6-14%
ZnO	3-10%
Na ₂ O	5-11%
K ₂ O	2-9%
Na ₂ O + K ₂ O	7-20%
Nd ₂ O ₃	at least 5% <u>5-10%</u> .

8. (*Canceled*)

9. (*Original*) A glass sheet in accordance with claim 7 wherein the sheet has a thickness of less than 0.5 mm.

10. (*Original*) A glass sheet in accordance with claim 7 wherein the glass has a liquidus viscosity of at least 20,000 poises and a softening point temperature in the range of 700-750°C.

11. (*Canceled*)